

SYLLABUS

OF A

Course of Lectures,

ON

NATURAL and EXPERIMENTAL

PHILOSOPHY.



I Z.

ASTRONOMY,
Use of the GLOBES,
PNEUMATICS,
ELECTRICITY,
MAGNETISM,
CHYMISTRY,

MECHANICS,
HYDROSTATICS,
HYDRAULICS,
ENGINEERING
FORTIFICATION
OPTICS, &c.

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S Y L L A B U S
Of a COURSE of LECTURES
O N

Natural and Experimental *PHILOSOPHY*.

THIS extensive Course consists of all the most curious, useful, new and entertaining parts of Philosophy; 'tis an Epitome of the whole Oeconomy of the Universe, as well as of the more familiar Parts of Nature, and very agreeably sets before the inquisitive Mind the most useful Productions of human Art and Enquiry: and as the terms are explained, and no stile affected but that of Simplicity and plainness, 'tis humbly presumed that the course is interesting to and may be comprehended by all ranks and stations in life, and is particularly adapted to such gentlemen and ladies as would chuse to be acquainted with the most rational and sublime parts of knowledge in the most easy manner and at the least expence. The course consists of twelve lectures; and the apparatus is the whole of that justly celebrated set of instruments collected by Mr. Griffith the lecturer, besides a great variety added to them by the present proprietor; and before this addition they were esteemed by the professors in both our universities the most compleat, extensive, and valuable collection in Great-Britain.

To enumerate the whole of this apparatus would far exceed the bounds of this paper—but a few of its particulars are these, viz. The grand orrery much improved, a transparent orrery, more like nature than any thing of the kind (invented by the author.) Variety of new constructed globes, spheres, planetariums, cometariums, &c. The whirling tables, air pump. Magazine and walking cane wind guns, condensers, &c. Reflecting, refracting and patent telescopes. All kinds of mirrours and deceptions. Lenses, &c. The artificial eye and ear, lungs, thorax, and diaphragma.

diaphragma. Solar and double microscopes. Camera obscura. Diagonal mirrors. Opera glasses. Magic lantern, &c. Dr. Halley's improved diving bell. All kinds of syphons, fountains and spouting pipes. The hydrostatic paradox, and variety of new methods of proving the upward, downward, and lateral pressure of water. Tide tables and other machines, invented by Mr. Ferguson. The pyrometer. The electrical machine greatly improved—the electrical battery, thunder-house, &c. Loadstones and all kinds of magnets. All the mechanical powers, with working models of various cranes, pumps, water-mills, pile-drivers, engines, the centrifugal machine, and a working fire-engine for draining mines, of the latest construction. Also another working fire-engine which by means of an inverted piston will do the same work at about two thirds the expence. Also another working model for the same purpose, which saves the expence of fire by forming the vacuum with cold water; and Blakey's patent-engine. Likewise a new contrived bucket engine, which works with a remarkable small quantity of water; and a wind-mill, which by cloathing and uncloathing itself moves with the same velocity in high or low winds. An horizontal wind-mill, invented by Joseph Henry, Esq. Working models also of the Duke of Bridgewater's curious canal and colliery, near Manchester; and also a machine that will raise water to any height to supply gentlemen's houses, towns or villages, without the assistance of wind, fire, water-wheel, man or beast, &c. The lectures will also be enlivened by a new musical instrument, contrived by the author, which he calls the CELESTINA, which has all the perfections of the organ, harpsichord, piano-forte, harmonica or psalter.

The lectures require about two hours attendance every day except Sunday for a fortnight; and will begin so soon as forty or more have subscribed one guinea each, to be paid at the first lecture, when the hours of attendance for the future lectures are desired to be fixed agreeable to the majority of the subscribers.

Heads



Heads of each Lecture.

LECTURE I. *General properties of matter.*

1. **T**HE infinite divisibility of matter. 2. Impenetrable hardness. And 3. Vis inertia of matter in general.
2. NEWTON's three laws of nature explained by them.
3. Laws of motion what.
4. Attraction of cohesion; and repulsion; fluidity, and solidity what.
5. Attraction of gravitation; its laws, and universality.
6. The momentum of falling bodies explained and calculated. Law of spouting fluids, &c. How two contrary motions will produce a third. How curves and projectiles are generated. How flying, swimming, &c. is performed. How bodies may roll upwards, &c.

LECTURE II. *MECHANICS.*

1. **T**HE great use and importance of mechanics.
2. How to calculate the force or momentum of a machine.
3. How time in working is substituted in the place of power.
4. The lever, wheel and axle, pulley, inclined plane, wedge and screw, explained by various models and experiments, and their united power defined in a jack and crane composed of them all.
5. Friction of both kinds what. Surfaces and pressure, and the extreme utility of friction wheels and rollers demonstrated by a curious machine.

LECTURE III. *MACHINES.*

1. **E**Xplanation by working models of the saw-mill. The common pile-driver. Voulou's pile-driver. Upright cylindrical mill. The equable moving wind-mill that cloaths and uncloaths itself. Mr. Henry's horizontal wind-mill. Mr. Craik's improved drill plow. A new ventilator. Coaches, carts, waggons, broad and narrow wheels. A large model of a fortification, and all its outworks, &c.

LECTURE

LECTURE IV. PNEUMATICS.

1. **G**ENERAL theory of the atmosphere. Its design in nature.

2. Tho' the lightest of all fluids, proved to be a body, and have weight, by the diving bell, by pressing the hand, by weighing, by forcing water into an exhausted bubble, by bursting a bladder, by a fountain in vacuo, by forcing mercury through the pores of wood, by the torricellian experiment.

3. How much this pressure is on every square inch shewn by the exhausted hemispheres.

4. These effects not produced by suction proved by two receivers, the pump in vacuo, and by transferring air.

5. How breathing is produced by the pressure of the air.

6. The spring of the air proved, by an almost empty bladder, by an egg, by fish brought up to the surface of water, by wood in warm water, by a shrivel'd apple, by bubbles in warm beer, by a spring fountain, by a bladder raising weights, &c.

7. Rarification what. How the cause of winds proved.

LECTURE V. PNEUMATICS.

1. **T**HAT *air* is capable of being condensed or squeezed into less room than it naturally possesses, proved by the condenser, by various fountains, and by the air guns.

2. That the *air's* resistance is the cause why light and heavy bodies descend not equally swift, proved by the guinea and feather.

3. That gunpowder can make no explosion without *air*.

4. That sound is derived from, and cannot exist without *air*, proved.

5. The manner of hearing defined.

6. That *air* is possessed of a vivifying spirit, proved by an artificial damp. Hence the reason of plagues, asthmas and other disorders incident to breathing a corrupt *air*: also the nature of mephetic and fixed *air*, proved by experiment.

7. How animals are affected in vacuo, proved by the lungs glats. and a quick animal put in the receiver.

8. That the *air* is a menstruum for water, proved.

Hence

Hence the reason of clouds, vapours, rain, hail, snow, &c.

LECTURE VI. *HYDROSTATICS.*

1. **S**TATICS, Hydrostatics, and a Fluid what.

2. Vacuities in fluids, proved.

3. Their particles hard, but how far incompressible, proved by the florentine experiment, &c.

4. Chymical trials of the qualities of water.

5. The fluids press according to their perpendicular height, without any regard to their surface, proved, by weighing water in itself, by imaginary surfaces, by columns of particles, by lead made to swim, by sunk quicksilver, by a bladder loose tied over the end of a tube, by the hydrostatic paradox.

6. That its side pressure is equal to its perpendicular one, proved by crooked tubes, by a vessel with equal holes in its sides and bottom, by water rising to its own height, and by the nature of jets or fountains.

7. Specific gravities, defined by wine rising in water, smoke in air, &c.

8. Nature of syphons, tantalus's cup, intermitting springs, capillary tubes, &c.

LECTURE VII. *HYDRAULICS.*

1. **H**OW pipes discharge according to their diameters and depth, proved by experiment.

2. The action and principles explained of all kinds of pumps, bucket engines, centrifugal machines, Fawkes's figures, &c.

3. An enquiry into the density of fluids by various hydrometers, &c.

4. Why a ship displaces as much water as equals its weight.

5. What weight is lost in water by a body heavier than water, and how to compare the specific gravities or weights bulk for bulk of all bodies whatsoever.

6. Principles and use of the hydrostatic balance.

7. Duke of Bridgewater's canal and colliery described.

LEC.

LECTURE VIII. *Electricity, Magnetism, and Chymistry.*

1. **H**OW bodies may be formed by liquids.

2. How smell, heat, cold, colours, &c. may be composed from substances seemingly inconsistent, and how decomposed, hence the curious chymistry of nature in the formation of mines, minerals, fossils, plants, medicinal springs, &c.

3. The undefined properties of matter, viz. magnetism, how and when discovered, when applied to navigation, Dr. Halley's opinion of the needle's variation.

4. The best way of making artificial magnets, how to deprive them of, or improve their attraction, &c.

5. Elementary or electrical fire what, and whence derived?

6. How it may be imprisoned, and hence the reason of the electric flash and shock.

7. Negative and positive electricity; the reason of thunder and lightning, proved by various experiments, on a new constructed machine.

LECTURE IX. *OPTICS.*

1. **D**issertation on the curious structure of the human body.

2. On lenses.

3. On light, what it is, the smallness of its particles, and quickness of its motion.

4. On refraction and reflection, the colours of the rainbow, the blue sky, and all the effects of telescopes, microscopes, cameras, opera glasses, magic lanthorn, diagonal mirrors, &c. accounted for by a dissection of each of these instruments and the nature of the lenses, mirrors, &c. of which they are composed.

5. Description and dissection of the eye, both artificial and natural, the uses of all its parts proved by both instruments and the eye itself, agreeably proving that the human structure has engaged an equal attention in the almighty architect with the rest of that creation delineated in this course.

LECTURE X. *Use of the GLOBES.*

1. **P**ROOF that the earth is round.

2. Why it approaches nearest to the figure of an oblate spheroid.

3. Proof that day and night are produced by the earth's turning round on its axis every twenty-four hours, and not by any motion of the sun.

4. App-

4. Antipodes accounted for by the universal law of gravitation.

5. Different lengths of day and night, and the seasons, how produced by the earth's annual motion round the sun, and its inclined axis.

6. Why mountains affect not the earth's roundness.

7. How and why geographers distinguish its surface by lines and circles, viz. meridians, horizon, equator, ecliptic, tropics, poles, &c.

8. Various problems performed on a new constructed globe.

9. Description and use of the celestial globe.

LECTURE XI. *On the MOON.*

1. **G**ENERAL theory of the moon, its design in the order of the system.

2. Its distance, diameter, face, and motion described.

3. Why it disappears, is horned, and full.

4. Why it goes not round its orbit or from change to change in the same time.

5. How the earth must appear to the lunarians.

6. How the earth and moon attract one another, and turn round their common center of gravity.

7. The reason of the harvest moon.

8. The nature and reason of eclipses.

9. Longitude how found by the eclipses of Jupiter's satellites.

10. The necessity and cause of tides, currents.

LECTURE XII. *ASTRONOMY.*

1. **A** Recapitulation of the philosophic systems of the ancients

2. That the newtonian system is not liable to the same errors because founded on experiment and observation.

3. Cartesian vortexes exploded.

4. The centrifugal and centripetal forces what.

5. The laws of planetary motion defined by them.

6. The description of each planet in the solar system, its motions, appearances, and moons.

7. Dissertations on the universe of systems.

N. B. An epitome of the lectures to assist the memory, to be sold by the author, price one shilling and six-pence; also optical instruments of all sorts.

* * * Noblemen or gentlemen may have this course read at their own houses on easy terms, and the use of the globes taught in a few days at a guinea.